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TWENTY-FIRST ANNUAL CONFERENCE OF STATE UTILITY COMMISSION ENGINEERS

The Twenty-First Annual Conference of State Utility Commission Engineers was held at the Sherman Hotel in Chicago, June 16 and 17, under the chairmanship of Wayne E. Limbocker of the State Corporation Commission of Kansas. Thirty engineers attended as representatives of 20 States, the Province of Ontario, Canada, and the Federal Government. The Bureau was represented by Richard L. Lloyd, assistant secretary of the conference.

The following technical papers were presented and discussed during the 2 days of the conference: Kva vs. kvar rates, Henry Hertz, New Jersey; The fuel clause in rate schedules of electric and gas utilities, E. Irvine Rudd, Connecticut; Discussion of fuel surcharges as applied to rates for gas and electric service in New Hampshire, F. E. Mindt, New Hampshire; Commission activities under war conditions, H. L. Gerrish, Maine; Cooperative planning between Federal and State agencies, P. L. Holland, Maryland (read by J. E. Flanders, Arkansas); The proper handling of fixed capital adjustment accounts, L. F. Riis, New Hampshire; Separation of telephone property revenue and expenses, E. F. McNaughton, California (read by C. T. Mess, California); Progress in New Hampshire, on continuing property records, L. J. Riis, New Hampshire; Preparation and establishment of continuing property records, O. S. Vogel, Georgia; Development of original cost of utility plant, C. T. Mess, California; Utility tax problems, A. R. Colbert, Wisconsin. In addition, a symposium on war regulation problems was arranged for the second day of the conference. The following three papers were presented: Introduction, J. W. Kushing, Michigan (read by C. R. Berry, Pennsylvania); Gas utilities, H. J. Wagner, West Virginia; and Telephone utilities. W. E. Limbocker, Kansas.

The Executive Committee appointed a Policy Committee and a Nominating Committee consisting of the following members: Policy Committee—F. E. Mindt, New Hampshire, chairman; C. E. Bryant, North Dakota; G. W. Clewley, Vermont; O. F. Foster, Ohio; Henry Herz, New Jersey; O. S. Vogel, Georgia. Nominating Committee—J. H. Mathews, Illinois, chairman; H. L. Gerrish, Maine; W. E. Limbocker, Kansas, ex officio; C. T. Mess, California; E. I. Rudd, Connecticut; H. J. Wagner, West Virginia.

The Policy Committee reported the following recommendations, which were unanimously adopted: (1) that the next meeting of the conference be held at

[1] Published with approval of the Director of the Budget.

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Washington, D. C., if possible, under the auspices of the National Bureau of Standards; (2) that the date of the next conference be fixed by the Executive Committee, preferably somewhat earlier than the date of the present conference; (3) that for the next conference, engineers of Federal regulatory commissions be invited to attend and participate in the proceedings of the conference on the same basis as the engineers of the State Commissions; and (4) that the National Bureau of Standards fulfill requests for papers only from engineers or other suitable representative of a commission which has been invited to participate in the conference.

On recommendation of the Nominating Committee, the following committees were elected for the next conference: Executive Committee—C. Radford Berry, Pennsylvania, chairman; O. S. Vogel, Georgia, vice chairman; A. E. Davison, Ontario; Warren Oakey, Wisconsin; E. C. Crittenden, National Bureau of Standards, secretary (assisted by Richard L. Lloyd, National Bureau of Standards). Program Committee—O. F. Foster, Ohio, chairman; C. E. Bryant, North Dakota; H. E. Abbett, Indiana; W. Kemp Walker, Oklahoma.

SPECIFICATION OF THE MUNSELL BOOK OF COLOR

The development of the Inter-Society Color Council-National Bureau of Standards (ISCC-NBS) system of color names, based on the color standards in the Munsell Book of Color (Technical News Bulletin 269, September 1939), made it necessary to specify the master standards of this book in basic terms. Accordingly, the spectral reflection curves of the 421 Munsell Standards were run, and the resulting colorimetric specifications were obtained for 4 illuminants, equivalent respectively to incandescent-lamp light, average daylight, lightly overcast north sky, and extremely blue sky. Average daylight was previously chosen as the standard illuminant for use in determining the color names of drugs and chemicals, and colorimetric charts have, therefore, now been prepared with this illuminant from which it is possible to select the appropriate color name descriptive of a color if its colorimetric specifications are given. Thus, the ISCC-NBS system of color names has, by this present fundamental, or basic, specification of the Munsell Standards, been made independent of the existence of the Munsell or any material color standards and can be determined, if desired, through the use of an appropriate spectrophotometer or colorimeter. This accomplishment is discussed in detail in a paper (RP1549) by Kenneth L. Kelly, Kasson S. Gibson, and Dorothy Nickerson in the August number of the Journal of Research.

OPTICAL ROTATION AND ATOMIC DIMENSIONS

In continuing an investigation of optical rotation and atomic dimensions, Dirk H. Brauns, formerly a member of the Bureau's polarimetry section, has extended his studies to specially prepared halogen derivatives of optically active pentanol-2. In the writer's previous investigations he suggested that certain optically active halogen derivatives may be divided into two classes. The first class has the halogen directly attached to an asymmetric carbon atom. For these substances the writer has formulated the rule that the differences of their *specific* rotations (Cl-F), (Br-Cl) and (I-Br) have the same numerical relation as the respective differences of the radii of the covalent-bonded halogen atoms (41 : 17 : 21). The second class of optically active halogen derivatives has the halogen attached indirectly (by a chain of atoms) to an asymmetric carbon atom. For these latter substances the rule was formulated that the differences of their *molecular* rotations have a numerical relation, which likewise agrees with that for the respective differences of the radii of covalent-bonded halogen atoms.

As these rules were established for halogen derivatives of carbohydrates, which contain several asymmetric carbon atoms it was found desirable to investigate halogen derivatives, which contain only one asymmetric carbon. The halogen derivatives of two active amyl alcohols were chosen for this investigation, and the results of the last communication (J. Research NBS **18**, 315 (1937) RP978, showed that the derivatives of the amyl alcohol, 2-methylbutanol-1, checked the above rule for class II very well. The present communication (RP1551, in the August Journal of Research) reports the results obtained in checking the above rule for class I with the halogen derivatives of the other active amyl alcohol, pentanol-2. Pure optically active *D*- and *L*-pentanol-2 were prepared and halogenated by different methods for obtaining the highest-rotating 2-fluoro-, 2-chloro-, 2-bromo-, and 2-iodopentane.

In spite of the difficulty that a partial inversion takes place in the halogenation, resulting in a mixture of *D* and *L* halogen derivative, the conclusion can be drawn that rule I is not contradicted by the values found, since the deviations can be plausibly explained by the incompleteness of the Walden inversion. Rule II should not be applicable to this type of compound and the results confirm this premise.

It is further shown that all halogen derivatives of pentanol-2 of like configuration have the same sign of optical rotation. The specific gravity, refractive-index, and boiling points at various pressures, were also determined.

BRAZILIAN RUBBER LABORATORY

The Bureau is assisting the Brazilian Government in the installation of a modern rubber laboratory at the Instituto Agrinomico do Norte at Belem (Technical News Bulletin 308, December 1942).

Word has been received that nearly all the machinery, supplies, and equipment purchased for the laboratory in the United States, have now arrived safely and are in process of installation. Even in advance of the completion of the laboratory, Norman Bekkedahl of the Bureau's rubber section, who is in charge of the work, and his assistant, Fred L. Downs, have been able to start investigations on methods of tapping and the preparation of crude rubber.

The location of the new laboratory at the mouth of the Amazon River, gives it convenient access to a wide variety of rubber-producing trees and plants; moreover, this strategic location should make it possible for the laboratory staff to aid in developing the entire Brazilian rubber industry. This is the only rubber laboratory in the tropics serving the United Nations.

THEORY OF THE POTENTIAL AND THE TECHNICAL PRACTICE OF ELECTRODEPOSITION

A paper by Charles Kasper which will appear in the Transactions of the Electrochemical Society deals with the effect of the terminal on the current distribution over an electrode in an electrolytic solution. Oddly enough, in the literature of electrochemistry no paper has dealt with this subject, in spite of the apparent wide appeal of such a publication. The present paper aims to fill the need and to make available to electrochemists an outline of the knowledge of mathematical physics through which it is possible to obtain definite ideas concerning the terminal effect.

Only one other paper in any literature deals with the terminal effect of an electrode in an electrolytic system; this is by Chester Snow and was published in J. Research NBS **17**, 101 (July 1936) RP905. In the present paper the subject is extended to other possible mathematical models that may be of practical importance in modern electroplating engineering. It is particularly in the recently developed continuous processes of electroplating of strip steel and round wire that dimensions (of the electrode) are encountered where the effect no longer may be of secondary importance or insignificant. It definitely must be taken into consideration in the "acid tin plating" of sheet steel for which so many installations are being erected at the present time. With these large scale installations there is the element of geometrical simplicity in the plating arrangement which is ideal for the application of mathematical methods, and the results obtained should be of value to the plant designers.

THERMAL EXPANSION OF COPPER ALLOYS

A paper (RP1550) by Peter Hidnert and George Dickson in the August number of the Journal of Research, gives data on the linear thermal expansion of some industrial copper-nickel, copper-nickel-aluminum, copper-nickel-tin, and miscellaneous copper alloys (copper-tin, copper-lead-antimony, copper-manganese-aluminum, copper-nickel-iron, copper-nickel-zinc, copper-nickel-tin-lead, copper-nickel-zinc-iron, copper-tin-zinc-lead, copper-zinc-iron-manganese) for various temperature ranges between 20° and 900° C. The addition of 3 percent of nickel or the combined addition of 4.5 percent of nickel and 5 percent of aluminum to copper was found to have little effect on the linear thermal expansion. The effect of various treatments on these copper-nickel and copper-nickel-aluminum alloys was also small.

The coefficients of expansion of two copper-nickel-tin alloys containing 20 and 29 percent of nickel were appreciably less than the coefficients of expansion of copper for temperature ranges between 20° and 600° C. For the range 20° to 900° C, the coefficient of expansion of the copper-nickel-tin alloy containing 20 percent of nickel is about 16 percent higher than the coefficient of expansion of copper.

Three copper alloys containing more than 28 percent of nickel showed the smallest coefficients of expansion of the miscellaneous alloys.

The coefficients of expansion of the copper alloys reported in this paper were found to be between 14.9×10^{-6} and 20.4×10^{-6} per degree centigrade for the range 20° to 100° C.

AIR PERMEABILITY FINENESS APPARATUS

A new apparatus has been designed by R. L. Blaine of the Bureau's cement section for measuring the fineness of granular materials by the air-permeability method. The new apparatus is analogous to the U-tube viscometer, in which the liquid in the tube provides the pressure difference and also serves to indicate the volume of flow. For comparative and control purposes, the fineness can be expressed in terms of the time required for a definite volume of air to pass through the sample. The apparatus is inexpensive, simple to make and to operate, and necessitates practically no critical materials. The method of testing is rapid, less than 10 minutes being required for a complete determination. Although designed primarily for comparative tests, the specific-surface values can be calculated from the constants of the instrument.

The results of tests with portland cements indicate that the fineness values obtained are reproducible and are in agreement with values obtained with the Lea-Nurse type air-permeability apparatus.

PROPERTIES OF CONCRETES MADE WITH VARIOUS TYPES OF CEMENTS

A knowledge of the tensile strength of concrete is important in studying failures of this material as the result of shrinkage, temperature variation, or other factors that may cause disruption. An improved tensile test method developed at the Bureau by Louis Schuman and John Tucker, Jr. employs cylindrical specimens, 4 by 16 inches. Loads are applied through threaded rods embedded in a rich mortar at the ends of the specimens.

Compressive and tensile strengths have been determined for concretes made with a number of cements of various types, including five normal, four moderate-heat, and three high-early-strength portland cements; two portland-pozzolan; one high alumina cement; and nine cements containing aerating agents. This last type has been used to reduce the disruptive effects of freezing and thawing. Stress-strain determinations in both tension and compression have also been made on the aerated concretes and on one normal concrete. The effect of varying sand-gravel ratio and of various coarse aggregates on tensile strengths were also studied.

According to the report on this work in the August Journal of Research (RP1552)), cements of the moderate-heat type, often used in large structures to prevent undue temperature rise, gave but slightly lower compressive and tensile strengths at early ages than normal portland cements. At later ages the strengths of these cements, both in tension and compression, often exceeded other types. The high-early-strength cements gave appreciably higher strengths at early ages than the other types of cement. The use of either a high-early-strength cement, or of a richer mix with a normal cement, appears to have greater advantage in securing high early tensile strength than high early compressive strength.

Aerated concretes were relatively high in tensile strength up to 7 days; thereafter both compressive and tensile strengths, as well as moduli of elasticity, were lower than for normal cements.

With some cements, tensile strengths attained maximum values between 7 days and 3 months. Tensile strengths were related to compressive strengths. For the same cement, tensile strengths varied greatly with sand-gravel ratio and the type of coarse aggregate used in the concrete.

PROPERTIES OF PORTLAND-POZZOLAN CEMENTS

The use of domestic portland-pozzolan cements has increased markedly during the past decade. Because of a scarcity of data, an investigation of some properties of these cements was started about 9 years ago by G. L. Kalousek and C. H. Jumper. As explained in an article on this work that will be published in the Journal of the American Concrete Institute, a group of 10 commercial portland-pozzolan cements, 2 Santorin Earth blends, together with 2 standard portland and 1 natural cements were used. The cements were tested for all or some of the following properties: Tensile and compressive strengths; resistances to cycles of freezing and thawing, and of freezing, thawing, and drying (at 65°C); linear changes caused by periodic alternations of the specimens be-

tween damp closet and laboratory; resistances to solutions of sodium and magnesium sulfates; linear changes during autoclaving; and heats of hydration. Chemical analyses were also made.

The strengths of the commercial portland-pozzolan cements for the most part approximated and in some instances exceeded those required by specifications for portland cements. The two laboratory blends and the natural cements gave low strengths. The linear changes of the concrete specimens, stored alternately in the damp closet and the laboratory, were nearly the same for all cements with the exception of one portland-pozzolan cement, which showed a small but continuous growth. The portland-pozzolan cements showed a better resistance to cycles of freezing, thawing, and drying (at 65°) than did the portland cements. However, no definite trends were manifested in the freezing and thawing tests. The commercial portland-pozzolan cements showed better resistance to the action of a 10-percent solution of Na_2SO_4 than the portland cements at 4 weeks. For longer exposures, however, the greater number of both types of cements had poor resistance.

The linear changes of neat bars caused by autoclaving were small for four of the five portland-pozzolan cements tested; the fifth showed an intermediate expansion. The heats of hydration determined for five portland-pozzolan cements ranged from 52 to 79 cal/g (average of 62) at 7 days and from 70 to 96 cal/g (average of 79) at 28 days.

PHYSICAL PROPERTIES OF TERRAZZO AGGREGATES

A study of the physical characteristics of 77 marbles used for terrazzo aggregates was recently completed at the Bureau in order to supply data for a specification control on the quality of terrazzo chips. The samples were supplied by 24 producers from quarries operated in 12 States, and were classified as calcites, dolomites, dolomitic marbles, serpentines, and travertines. Abrasive resistence, bulk specific gravity, absorption, and toughness tests were made on the rock in its natural state, and the percentages of dust and voids, and thickness-grading tests were made on samples of No. 2 aggregate (chips passing a ⅜-in. and retained on ¼-in. mesh). A few samples, including two that were reported to have given trouble in terrazzo installations, were subjected to further tests to determine their expansion while absorbing water and contraction while drying. One sample was tested for thermal expansion over the range —24° to +60° C.

Only a few samples were found to be of low wear resistance, and over half should be satisfactory for heavy traffic conditions. Absorption values varied over a wide range, the lowest being 0.03 percent for a black marble, and the highest 7.4 percent for a weathered serpentine. This test indicates the relative susceptibility of various aggregates to absorb staining matter. Bulk specific gravity values varied from 2.20 for a weathered serpentine to 2.98 for a dolomite, corresponding to weights of 137 to 186 lb/ft^3 for the rock in its natural state. Several samples gave toughness values (resistance to impact) below 5. Samples of low toughness included the travertines and coarsely crystalline materials. This property is a measure of tenacity, and aggregates of low toughness show a tendency to form appreciable amounts of dust in the shipping containers.

The spaces between chips (voids) have a bearing on the actual volume of stone in portions measured for mixing. The percentage of voids is affected by the shapes of the particles as well as by their grading from fine to coarse. Aggregates in which the shapes of the particles are nearly equidimensional have voids as low as 40 percent, whereas aggregates containing many flat or elongated chips have voids over 50 percent. When portions of aggregate are weighed to obtain the mix proportions (usually 1 part cement to 2 parts aggregate), the corresponding volumes may vary considerably. A given weight of a light aggregate having high voids may differ in volume from that of the same weight of a heavy aggregate having low voids by as much as 30 percent. The percentage of voids in a well-compacted aggregate is from 3 to 5 percent less than when portions are measured without compacting.

A test was devised to separate samples of No. 2 aggregate into four fractions with respect to particle thickness. The results show characteristic differences between aggregates that are not indicated by other tests. One aggregate reported to give frequent trouble in terrazzo floors was found to have over 80 percent of particles less than $\frac{3}{16}$ inch thick. Terrazzo mixtures are usually made with an excess of cement paste and rolled, after placing, to remove the surplus. It seems likely

that the shapes of the chips may have a pronounced effect on the amount of paste that can be removed by rolling.

One sample expanded considerably during the absorption of water and contracted a similar amount in drying. The change was approximately equal to that accompanying a 70° C change in temperature. The thermal expansion of an impure calcite was found to vary greatly over different temperature intervals and also for different directions in the stone. The highest coefficient was 0.0000087, but negative coefficients were found for one direction of measurement between 10° and 25° C.

The complete account of this work will be found in Building Materials and Structures Report BMS98, copies of which are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 15 cents each.

RELATIVE SLIPPERINESS OF FLOOR AND DECK SURFACES

The slipperiness of any surface is important to the physical well-being of those who walk on it. Considerable thought has been given to ways of improving the antislip characteristics of paving and flooring materials. Probably the most common method is to provide a roughened surface. This is accomplished by corrugating or embossing some floor coverings and in other cases by embedding rough abrasives in the surface. Rough surfaces are difficult to maintain and keep clean and thus are not desirable for general indoor use. On the other hand, smooth-faced materials are extensively employed as floor coverings, and information on their relative slipperiness is important.

With this need in mind, a machine has been constructed by Percy A. Sigler at the Bureau which incorporates a new and practical method of determining the relative slipperiness of floor surfaces under both dry and wet conditions.

The machine and method of testing are described in Building Materials and Structures Report BMS100, which was released a short time ago. The results of tests of 116 floor and deck materials are given, including such general types as stone, terrazzo, cement-mortar, magnesite, ceramic tile, metal, asphalt, rubber, linoleum, and wood.

Test data are given, showing the effect of abrasives, embossments, and different wax finishes on the antislip properties of selected floor materials.

In general, considerable difference in slipperiness was found between dry and wet surfaces. Most of the floor materials showed satisfactory antislip properties when dry, whereas many would be classed as hazardous when wet.

Copies of BMS100 are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 10 cents each.

WALL CONSTRUCTION WITH FIBER INSULATING BOARD

Fiber insulating board has been widely used for interior finish in drywall construction. However, certain properties of the material have heretofore restricted the choice of surface design and decoration to paneled effects and painted finishes. In a recent investigation at the Bureau the difficulties which have prevented the use of other methods of design and decoration were traced to the conventional means adopted for fastening the boards to the framing.

As explained in Building Materials and Structures Report BMS97, which was released a short time ago, it was found possible to overcome these difficulties by eliminating the usual nailing and substituting invisible flexible fasteners. This principle of fastening the boards in place permits the entire surface of a wall or ceiling to expand and contract as a single unit with variations of relative humidity. Several methods of fastening to obtain these "floating" effects were worked out and used successfully in experimental walls. Their use permitted the application of all of the decorative treatments normally applied to plaster walls, including papering. Paneled effects were not required.

Copies of BMS97 are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C. The price is 10 cents.

STRUCTURAL AND HEAT-TRANSFER PROPERTIES OF "MULTIPLE BOX-GIRDER PLYWOOD PANELS"

To determine structural and heat-transfer properties, tests were conducted by the Bureau in cooperation with the Forest Service, U. S. Department of Agriculture, at the request of the War Department on wall, floor, and roof specimens of "Multiple Box-Girder Plywood Panels" sponsored by Loren H. Wittner. The specimens were constructed by gluing and nailing one sheet of plywood between two frames and facing the outer surfaces with other sheets of plywood. The longitudinal and transverse members of the frames

with the sheets of plywood formed closed cells, which provided heat insulation.

The wall specimens were subjected to compressive, transverse, concentrated, impact, and racking loads; the floor specimens to transverse, concentrated, and impact loads; and the roof specimens to transverse and concentrated loads. The loads simulated those to which the elements are subjected in actual service.

The deformations under load and the sets after the load was removed were measured for uniform increments of load. The results are presented in graphs and tables.

The heat-transfer properties of three wall specimens were determined in a shielded hot-box heat-transfer apparatus.

The results of these tests have just been published as Building Materials and Structures Report BMS99. Copies are obtainable at 15 cents each from the Superintendent of Documents, Government Printing Office, Washington. D. C.

NEW AND REVISED PUBLICATIONS ISSUED DURING JULY 1943

Journal of Research [2]

Journal of Research of the National Bureau of Standards, volume 31, number 1, July 1943 (RP1545 to RP1548, inclusive). Price 30 cents. Annual subscription, 12 issues, $3.50.

Research Paper [2]

[Reprint from the April 1943 Journal of Research]

RP1533. Effects of added materials on some properties of hydrating portland cement clinkers. Edwin S. Newman, Raymond L. Blaine, Charles H. Jumper, and George L. Kalousek. Price 10 cents.

Building Materials and Structures Reports [2]

[Persons who wish to be notified of new publications in the Building Materials and Structures series as soon as they are available should write to the Superintendent of Documents, Government Printing Office, Washington, D. C., asking that their names be placed on the special mailing list maintained by him for this purpose.]

BMS97. Experimental dry-wall construction with fiber insulating board. Charles G. Weber and Robert C. Reichel. Price 10 cents.

BMS98. Physical properties of terrazzo aggregates. Arthur Hockman and Ross E. Anderson. Price 15 cents.

BMS99. Structural and heat-transfer properties of "Multiple box-girder plywood panels" for walls, floors, and roofs. Sponsored by Loren H. Wittner. Herbert L. Whittemore, Vincent B. Phelan, and Richard S. Dill Price 15 cents.

BMS100. Relative slipperiness of floor and deck surfaces. Percy A. Sigler. Price 10 cents.

Simplified Practice Recommendations [2]

R42–43. Grocers paper bags. (Supersedes R12–25). Price 5 cents.

R196–42. Glass containers for green olives. Price 5 cents.

R197–42. Glass containers for maraschino cherries. Price 5 cents.

R199–43. Cloth window shades. Price 5 cents.

Annual Report

Annual report of the Director, National Bureau of Standards for the fiscal year ended June 30, 1942. (Obtainable without charge from the Bureau.)

Technical News Bulletin [2]

Technical News Bulletin No. 315, July 1943. Price 5 cents. Annual subscription, 50 cents.

MIMEOGRAPHED MATERIAL

Letter Circulars

[Letter Circulars are prepared to answer specific inquiries addressed to the National Bureau of Standards and are sent only on request to persons having a definite need for the information. The Bureau cannot undertake to supply lists or complete sets of Letter Circulars or send copies automatically as issued.]

LC727. List of commercial standards. (Supersedes LC722).

LC728. Bibliography on the measurement and gaging of gears.

RECENT ARTICLES BY MEMBERS OF THE BUREAU'S STAFF PUBLISHED IN OUTSIDE JOURNALS [3]

Some notes on standardization with particular reference to retail package sizes. Ralph W. Smith. Scale J. (1703 East 84th St., Chicago, Ill.) **29**, No. 10, 5 (July 1943).

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[2] Send orders for publications under this heading only to the Superintendent of Documents, Government Printing Office, Washington, D. C. Subscription to Technical News Bulletin, 50 cents a year; Journal of Research, $3.50 a year (to addresses in the United States and its possessions and in countries extending the franking privilege); other countries, 70 cents and $4.50, respectively.

[3] These publications are not obtainable from the Government, unless otherwise stated. Requests should be sent direct to the publishers.

Colorblindness and the detection of camouflage. Deane B. Judd. Science (Science Press, Lancaster, Pa.) **97**, 544 (June 18, 1943).

Facts of color-blindness. Deane B. Judd. J. Optical Soc. Am. (Am. Inst. Physics, 175 Fifth Ave., New York, N. Y.) **33**, 294 (1943).

Conservation of linseed oil in paints. Eugene F. Hickson. Organic Finishing Section of Metal Finishing (11 West 42d St., New York 18, N. Y.) 467 (July 1943).

The center of shear again. William R. Osgood. J. Applied Mechanics (Am. Soc. Mech. Engrs., 29 West 39th St., New York, N. Y.) **10**, No. 2, A–62 (June 1943).

The technical cohesive strength and other mechanical properties of metals at low temperatures. D. J. McAdam and R. W. Mebs. ASTM Preprint No. 40 (June 1943).

The testing and properties of low-tin solders listed in recent Federal Specifications. J. A. Kies and W. F. Roeser. ASTM Preprint No. 36 (Am. Soc. for Testing Materials, 260 South Broad St., Philadelphia, Pa.) (June 1943).

How the Bureau of Standards serves. Hugh G. Boutell. Domestic Commerce (Department of Commerce, Washington, D. C.) **31**, No. 20, 10 (July 1943).

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